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## Bees of the Genus *Perdita* in the Collection of the University of Kansas (Hymenoptera, Apoidea)\*

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ABSTRACT: This article is a revisionary study of the bees of the genus *Perdita* Smith, subgenera *Xerophasma*, *Cockerellula*, *Macroteropsis*, *Cockerellia*, and two other un-named groups, in the collection of the University of Kansas. Twenty-one species are treated; of these, eight species are new. Four new subspecies are also described.

This is a first report on a large collection of bees of the genus *Perdita* submitted to the author in the fall of 1950 by Charles Duncan Michener, and collected mostly in the states of Kansas and Texas. Types of new forms will be found in the collection of the University of Kansas, at Lawrence, Kansas.

#### SUBGENUS XEROPHASMA Cockerell

##### *Perdita bequaertiana* Cockerell

*Xerophasma bequaerti* Cockerell, Amer. Mus. Novitates vol. 66, 1923, p. 2, ♀ (not *Perdita bequaerti* Viereck, 1917).

*Perdita bequaertiana* Cockerell, in Muesebeck, Krombein, and Townes, U. S. Dept. Agri. Monog. No. 2, 1951, p. 1087.

One male, 11 females, Big Springs, Howard Co., Texas, June 20, 1947 (R. H. Beamer).

No flower record accompanies these specimens, but several of the females bear the coarse cobwebby pollen of *Oenothera*.

This is a large pallid bee (very large for the genus *Perdita*), and in the female the ocellar region, usually including the face above level of antennae and the vertex behind ocelli more faintly, may be slightly infuscated. On the abdomen a pale brownish, or dilute fuscous, preapical crossband, not quite reaching lateral margins, is usually present in tergites 1 to 5. The structural characters have been described rather fully by Cockerell, but one feature not mentioned by him is the fact that the antennae are inserted unusually high on the face or above the middle of the eyes, in which respect members of *Xerophasma* differ from all other *Perdita*. The mouth parts are moderately elongate. Maxillary palpi are long and six-jointed, the first five joints subequal, the sixth somewhat shorter. Labial palpi are about equal to the maxillary pair, the first joint very long, the last three joints each about equaling the apical joint of the maxillary pair.

The male resembles the female except in the primary sexual characters. The only specimen at hand lacks the abdominal banding, and the dark cloud on the head is restricted to the area between the ocelli. Aedeagus composed of a rather large quadrate capsule, about one half longer than wide and somewhat wider than high. Stipites produced ventrally on each side in a slender lobe, which is abruptly bent inward and upward at the extreme tip. Sagittae moderately stout, tapering toward apex, which is narrow and thinly compressed dorsoventrally. Volsellae very large, the inferior pair reaching middle of sagittae and provided with numerous minute black tubercles along the dorsal margin; dorsal volsellae reaching middle of inferior pair. Length of male, about 9 mm.; anterior wing, 7 mm.

This species was described from a female collected about 10 v. m., July 9, 1917, at Fabens, El Paso Co., Texas.

#### SUBGENUS COCKERELLULA Strand

In 1922 (*Amer. Mus. Novitates*, vol. 47, pp. 1-4) Cockerell described *Perdita opuntiae* and erected the subgenus *Lutziella* for its reception. Because *Lutziella* Cockerell was preoccupied by *Lutziella* Enderlein, Strand, in 1932 (*Folia Zool. Hydrobiol. Riga*, vol. 4, p. 196), proposed to rename it *Cockerellula*.

The group *Cockerellula* is similar to *Macrotera* Smith, but differs in having the tongue short and the abdomen of the male modified in

various ways, either at the apex or on the ventral surface. It is quite possible that discovery of additional species may reveal that these characters are gradational and only of specific importance, since members of both groups seem to be largely, although not completely, dependent on the pollen of various species of *Opuntia*.

The several species belonging in *Cockerellula* may be distinguished as follows:

- |   |                              |
|---|------------------------------|
| 1. Males .....  | 2                            |
| Females .....   | 5                            |
| 2. Basal ventrite without a median fold .....   | 3                            |
| Basal ventrite strongly puckered out in middle of apical margin to form a strong fold, the following ventral segments unmodified .....  | 4                            |
| 3. Second ventrite with a broad thickening on middle of apical margin, this thickening strongly dentate at outer ends; apical tergite very broad, with a slender, almost fingerlike lobe at the apical corners, and evenly truncate between the lobes; head and thorax black or blackish brown, with pale-yellow face marks; abdomen ferruginous; length, about 5.5 mm.; Colorado (White Rocks near Boulder) and South Dakota (Pine Ridge) .....  | <i>opuntiae</i> Cockerell    |
| Second ventrite only slightly thickened at middle of apex, the third ventrite with a strong thickening which is unarmed at outer ends and presents a transverse disk as viewed from behind; apical tergite quadrate, with apical corners slightly dentate, the disk a little concave and produced medially in a rounded angle a little beyond and below the dentiform lateral angles; head and thorax dark blue-green, the face below antennae pale yellow; abdomen ferruginous; length about 4-4.5 mm.; Texas (Big Bend Park) .. | <i>bidenticauda</i> sp. nov. |
| 4. Tergite 7 extremely broad, transversely quadrate, not at all narrowed to apex, which is truncate and at most with a small median notch; head and thorax dark blue-green, the face below antennae yellowish white, abdomen ferruginous; length, about 4 mm.; Texas (15 miles southeast of Dryden),  | <i>laticauda</i> sp. nov.    |
| Tergite 7 similar to that of <i>laticauda</i> but more convex, distinctly grooved medially and emarginate at apex, thus forming a broad, slightly oblique lobe on each side; head and prothorax brown, the face below antennae pale yellow; thorax otherwise dark blue-green, more or less washed with brown on pleura, sternum, and apical truncation of propodeum; abdomen ferruginous; length, 4-4.5 mm.; Texas (15 miles northwest of Mission) .....  | <i>lobata</i> sp. nov.       |
| 5. Head and thorax dark green; smaller species .....  | 6                            |
| Head and thorax black, the abdomen ferruginous; mesoscutum shining, delicately tessellate and with minute close punctures; length, about 6 mm. ....   | <i>opuntiae</i> Cockerell    |

6. Mesoscutum tessellate but shining, finely punctured, the punctures about two to three puncture widths apart; abdomen ferruginous; length, about 4-4.5 mm. . . . . *bidenticauda* sp. nov.  
 Similar to preceding and without good distinguishing characters in the female sex. . . . . *laticauda* sp. nov.

*Perdita bidenticauda* sp. nov.

Allied to *P. opuntiae* Cockerell but distinguished by its smaller size and dark-green color, and by the very small lateroapical teeth of the apical tergite of male.

MALE.—Head and thorax dark green, slightly bluer on metanotum and propodeum and gradually changing to brown on under surface of head and at anterior end of cheeks. Narrow inferior orbits near base of mandibles, mandibles, except the rufous tips, and entire face below level of antennae, pale yellow, with the broad upper margin of lateral marks oblique and reaching upper level of antennal sockets and intruding slightly between the fovea and eye margin on the orbits. Tubercles and anterior margin of pronotum brownish. Abdomen ferruginous red, with only the lateral foveae of second tergite black. Legs black, more brownish at base, the front tarsi and the front tibiae, except a brownish line behind, dull yellow. Antennae almost uniformly pale brown. Tegulae pale testaceous yellow. Wings nearly clear hyaline, the nervures brown, the subcosta more fuscous.

Head but little enlarged, broader than long, with the inner orbits slightly diverging below. Mandibles nearly straight, robust, and tapering to the blunt apex which has a small inner tooth. Labrum twice as broad as long. Subantennal plates very small, the lateral plates broad and becoming much broader at anterior ends. Clypeus short and transverse. Frontal foveae about three times as long as wide and well impressed. Cheeks simple and moderately wide. Abdomen moderately broad and depressed. Apex of last tergite rather broad and truncate, the apical corners a little dentiform, the disk slightly concave and medially produced a little beyond and well below level of the dentiform angles; as seen from behind and beneath, the lower apical margin is carinate and forms a broad ogival curve. First segment of venter normal, the second segment slightly, and the third strongly, swollen in middle of apical margin; this swelling elongate-oval as seen from behind, declivous, and with outer ends acute but not at all prominent or dentiform. Marginal cell about one fourth smaller than first submarginal cell, broad and oblique at apex, with the apendiculation of radius distinct and elongate.

First recurrent nervure received near apex of first submarginal cell. Stigma small and very narrow. Head and thorax minutely tessellate and dullish, the disk of mesoscutum more shining than other parts, the mesopleura duller, with the sculpture more lineolate and the basal middle of propodeum comparatively coarsely tessellate. Punctures of frons and mesoscutum minute and close, those of vertex sparser, and those of disk of clypeus coarser and shallow. Mesopleura impunctate except toward the sternum. Abdomen moderately shining. Pubescence whitish, short and sparse, that of abdomen extremely fine and subappressed, but a row of coarse, stiff hairs present across disk of tergite 6, and similar hairs on outer side of hind tibiae. Length, 3.45-4 mm.; anterior wing, 3 mm.

**FEMALE.**—Dark green, or blue-green, the metanotum and propodeum more bluish, the abdomen ferruginous red. Clypeus, supraclypeal area extending in a triangle well above antennae, and narrow orbital margins of face, black. Labrum brownish. Mandibles testaceous yellow, with rufous tips. Antennae rather dark brown, the flagellum dull yellowish beneath. Legs dark brown, the tarsi paler, the front knees with a small yellowish spot, the spurs reddish. Tegulae brown at base and pale testaceous on outer margin. Wings as in male.

Head as wide as long, the clypeus much larger and more produced than in male. Inner orbits of eyes parallel. Mandibles simple at apex. Frontal foveae about five times longer than wide and deeply impressed. Pygidium of abdomen acute at apex. Hind knee plates distinct. Spurs of middle and hind tibiae slightly hooked at apex and minutely serrate beneath. Claws with a small inner tooth just beyond the middle. Sculpture as in male except as follows: labrum, clypeus, and supraclypeal area with coarse, shallow punctures; frons and vertex with well-separated punctures that are much sparser than those of mesoscutum; abdomen duller, more strongly lineolate than in male, and impunctate. Pubescence as in male, the apical fimbria of abdomen tinged with fuscous. Scopal hairs of hind tibiae sparse and moderately long; those of dorsal margin with minute, close-set, short branches. In comparison with *opuntiae*, the scopal hairs are definitely shorter and sparser. Length about 3.45-4.5 mm.; anterior wing, 3-3.2 mm.

Holotype male, allotype, and 6 males, 2 females (paratypes) at flowers of *Opuntia*, Cooper's store, Big Bend Park, Texas, April 11, 1947 (Michener and Beamer).

Two of the females bear the extremely coarse pollen from *Opuntia*, and the third a much finer pollen from some other flower.

*Perdita laticauda* sp. nov.

Allied to *P. bidenticauda*, but the male has distinctive differences in the ventral segments and apical tergite of the abdomen. The females of the two species are apparently indistinguishable.

MALE.—Remarkably similar to the male of *bidenticauda* except in regard to the special characters of abdomen. Color the same, with the yellow mark on cheeks near base of mandibles either large or evanescent. First ventrite of abdomen strongly folded in middle of the apical margin, thus producing a large projecting pucker. Following ventrites little modified, although the third has a transverse preapical band of short dense hair, occupying the middle third of the width. Apical tergite extremely large and broad, more than twice as broad as long, and broadly truncate at apex, the truncation with a small median notch. Length, 3.5-4 mm.; anterior wing, 2.8-3 mm.

FEMALE.—Like the female of *bidenticauda*. First tergite sometimes infuscated on basal half. Length, 3.45-4.5 mm.; anterior wing, 2.8-3 mm.

Holotype male and allotype, 15 miles southwest of Dryden, Terrell County, Texas, at flowers of *Gilia acerosa*, April 13, 1949 (Michener and Beamer). Also the following paratypes taken at the same time and place: 10 males, 8 females on *Gilia*, and 2 males, 6 females on flowers of *Chamaesaracha conioides*.

The females bear a moderately fine-grained yellow pollen, which probably was derived from the *Gilia* flowers, as it seems to be slightly coarser and less pale yellow than the pollen borne by other species of *Perdita* that have been taken at flowers of *Chamaesaracha*.

*Perdita lobata* sp. nov.

This species is similar to *P. laticauda* but has the apical tergite even broader, more convex from side to side, rather strongly grooved medially, and broadly and shallowly emarginate in middle to form two broad, truncate apical lobes.

MALE.—Head enlarged, nearly as bulky as thorax, the temples and cheeks broad. Inner orbits distinctly diverging anteriorly. Mandibles with a weak inner tooth at apex. Frontal foveae well impressed, about five times as long as wide. Abdomen depressed and much broader than thorax. First ventrite with a strong fold in middle of apical margin, the fold producing a puckerlike process. A band of dense short hair on the third ventrite. Apical tergite as described above. Structural characters, sculpture and pubescence otherwise about as in *laticauda* and *bidenticauda*.

Thorax dark bluish green, a little suffused with brown, especially below the wings and on the sides and apex of propodeum. Entire prothorax and the head reddish brown, the frons with a slight greenish tinge. Mandibles, except piceous tips, labrum, face below level of antennae, and mark at anterior end of cheeks, pale yellow. The yellow of face gradually merges into the brown and extends slightly above the level of antennae on each side. Abdomen ferruginous red, nearly the same color as the head. Foveae on lateral margins of tergite 2 very short and black. Legs brown, the front tibiae on anterior side and front tarsi dull yellow. Antennae nearly uniformly pale brown. Tegulae pale testaceous. Wings hyaline, the nervures brown, the subcosta darker brown. Length, 4-4.5 mm.; anterior wing, 3 mm.

Two males (holotype and paratype), 15 miles northwest of Mission, Hidalgo County, Texas, on *Opuntia*, March 30, 1946 (C. D. Michener).

#### SUBGENUS MACROTEROPSIS Ashmead

##### *Perdita latior* Cockerell

Sixteen males, 5 females from the following localities in Arizona: 6 miles east of Douglas, Aug. 11, 1940; Portal, Aug. 12, 1940; Cave Creek, Chiricahua Mts., Aug. 12, 1940 (Michener); and Rustler's Park, Chiricahua Mts., July 5, 1940 (D. E. Hardy).

This is a common species in New Mexico and Arizona at flowers of *Sphaeralcea*.

One specimen of a new species of this group was also taken by Michener near Portal, Arizona, at flowers of *Sphaeralcea*. This will be described elsewhere.

##### *Perdita arcuata dinognatha* Cockerell

Many of both sexes from Mazourka Canyon, 6,000 feet, Inyo Mts., California, on *Sphaeralcea ambigua*, May 23, 1937 (Michener). Also taken at Mountain Springs Canyon, Argus Mts., 5,000 feet, Inyo County, May 22, 1937; Andreas Canyon near Palm Springs, April 6, 1939; Ribbonwood, San Jacinto Mts., May 21, 1940 (Michener); Piñon Flat, San Jacinto Mts., May 18, 1939 (E. G. Linsley); San Bernardino County, May 1, 1920 (W. Benedict); and Westgard Pass Plateau, Inyo County, May 27, 1937.

This form differs from *P. arcuata arcuata* Fox from Baja California merely in having the very short transverse clypeus of the male yellow.



*Perdita trifasciata* sp. nov.

This little species belongs to a new group which will be accorded subgeneric standing in a subsequent paper. In this group belong five species from the Colorado Desert of California, which are usually found at flowers of *Coldenia*. The New Mexico species differs from all except one of the California species in having the abdomen dark, and from the exception in having the face marks reduced and the pale abdominal bands very narrow and only three in number.

MALE.—Head and thorax dark olive-green, with yellowish-white markings as follows: basal half mandibles (these gradually changing to red at apex), labrum, clypeus, except usual dots and two broad brown stripes (somewhat farther apart than their own width) on disk, transversely linear lateral marks not reaching above level of clypeus, and a small spot on tubercles and at posterior corners of pronotum. Middle of supraclypeal area brownish around a very small whitish spot. Antennae nearly uniformly brown above and testaceous yellow beneath. Legs blackish, the front and middle knees, tibiae and tarsi, base of hind tibiae, and base of both hind tibiae and tarsi, pale yellow; front and middle tibiae blotched with brown behind. Abdomen black with a very narrow subapical yellowish-white band on tergites 1 to 3, the band on tergites 1 and 2 emarginate behind on each side, and that on tergite 3 broadly interrupted on each side. Tegulae testaceous brown. Wings somewhat dusky, the nervures and margins of stigma brown.

Head quadrate, as broad as long, the face below antennae prominent, the temples moderately wide. Disk of clypeus about one half as long as wide and shorter than the transverse length of the lateral extensions. Stigma narrowly lanceolate. Substigmatal and poststigmatal portions of marginal cell equal. Claws bifid. Sculpture of head and thorax microscopically tessellate, imparting a soft, dull, satiny appearance. Abdomen considerably smoother and more shining than thorax. Pubescence white, rather short, sparse, and coarse; that on mesoscutum subappressed. Length, about 2.5-3 mm.; anterior wing, 2.1-2.5 mm.

Two males (holotype and paratype), White Sands, New Mexico, June 27, 1940 (R. H. Beamer).

In Cockerell's table (1896) this species does not run easily, but probably goes best to *P. austini* Cockerell, which is a somewhat larger, shining species, with the lateral face marks reaching above level of the antennae.

*Perdita ainsliei* Crawford

One male, Sioux City, Iowa, July 26, 1924 (C. N. Ainslie).

The *ainsliei* group, which contains the following and some eight other undescribed species from the Southwest, apparently deserves subgeneric recognition.

*Perdita peculiaris* sp. nov.

A dark blue-green species, differing from *P. ainsliei* Crawford in the black abdomen and in having the light markings restricted to the mandibles and a narrow anterior band on disk of clypeus. (In *ainsliei* the abdomen is ferruginous and the clypeus and quadrate lateral marks are yellowish white.) In Cockerell's table (1896) this new species runs to a female variety of *P. phymatae* Cockerell which is only superficially similar.

MALE.—Head and thorax dark blue-green, the abdomen black. Mandibles, except rufous tips, and a band on anterior margin of disk of clypeus, yellowish white. Remainder of clypeus black. Labrum brown. Antennae blackish, the flagellum more brownish and becoming broadly rather light brown beneath. Legs black, the small joints of tarsi brown. Tegulae testaceous brown. Wings somewhat dusky hyaline, the nervures and margins of stigma sepia brown.

Head about as wide as long, rather thick fronto-occipitally, the face below antennae strongly convex. Clypeus prominent, its anterior margin rounded out and well elevated. Cheeks much narrowed anteriorly and simple. Subantennal plates about as broad as high. Inner anterior corners of lateral plates of face rounded and somewhat tumescent next to disk of clypeus. Abdomen broadly ovate, convex above, a little broader than thorax. Stigma of fore wing narrowly lanceolate. Marginal cell broadly and obliquely truncate at apex, with the portions beneath and beyond the stigma equal. Outer nervure of second discoidal cell obsolescent. Claws bifid. Mandibles moderately long, curved, and simple. Maxillary palpi rather long and six-jointed. Head and thorax minutely tessellate and moderately shining, the metanotum and propodeum strongly tessellate and more dullish than other parts. Puncturation of mesonotum very fine and close, and that of frons moderately sparse. Abdomen also dullish from a minute dense puncturation (in which it differs from *ainsliei* as well as almost all other species of *Perdita*) except on the depressed apical margin of the tergites. Pubescence fine, sparse, and inconspicuous. Length, about 3-4 mm. (the abdomen much recurved at apex); anterior wing, 2.5-3 mm.

Aedeagus of the type of *P. ainsliei*; the long slender apical lobes of stipes abruptly thickened and bent downward at apex (acuminate and very sharp at apex in *ainsliei*). Sagittae forming a fusiform body, tapering to the acute apex, as seen from side, but the tip of each rod expanding acutely outward, as seen from above, and armed with a slender upward-directed spine at the inner apical corner (in *ainsliei* rather similar, but without the apical spine and clothed beneath with a loose fascicle of hairs close to the apex). Volsellae reduced to one pair, which are rather long and acuminate, as seen from above (two pairs of volsellae in *ainsliei*).

Two males (holotype and paratype), 15 miles southeast of Dryden, Terrell Co., Texas, on *Chamaesaracha conioides*, April 13, 1949 (Michener and Beamer).

#### SUBGENUS COCKERELLIA Ashmead

The type of *Cockerellia* is *P. hyalina* Cresson, which has been usually considered the male of *P. albipennis* Cresson, although the synonymy is doubtful. Excepting *Xerophasma*, the species of *Cockerellia* are the largest in the genus *Perdita* and are found almost exclusively at flowers of Compositae, mostly of the genera *Helianthus*, *Rudbeckia*, *Ratibida*, *Baileya*, *Verbesina*, *Coreopsis*, *Geraea*, and *Gaillardia*, but with records also from *Erigeron*, *Heterotheca*, *Pectis*, and *Prionopsis*.

#### KEY TO THE SPECIES OF COCKERELLIA FEMALES

- |   |   |
|---|---|
| 1. Head and thorax mainly green.....  | 2 |
| Mainly bright yellow, the lower half of pleura black; clypeal dots, facial foveae and flagellum above, also blackish; mesonotum with short, dense, erect yellow hair..... <i>beata</i> Cockerell  |   |
| 2. Clypeus yellow or whitish, the lateral marks triangular and reaching level of antennae or beyond.....  | 3 |
| Face marks restricted to spots on clypeus and transverse lateral marks, the latter not extending above level of clypeus..... 6  |   |
| 3. Mesonotum minutely, densely punctate, the punctures not much more than their own diameter apart; supraclypeal area entirely dark.....  | 4 |
| Mesonotum polished, finely punctured, the punctures although very numerous, several times their own diameter apart; clypeus, triangular lateral marks, and a vestigial supraclypeal mark, yellowish white; prothorax, legs in large part and abdomen yellow, the abdomen with four black bands,<br><i>utahensis</i> Cockerell |   |
| 4. Head and thorax brassy green, the mesonotum a little tessellate and dullish between the punctures.....   | 5 |

- Head and thorax dark blue-green; mesonotum shining, the dense punctures very minute; base of mandibles, clypeus, lateral marks, prothorax and legs in large part, and abdomen, yellowish white, the abdomen with five black bands; pubescence white . . . . . *baileyae* Cockerell
5. Clypeus and lateral marks white; prothorax, legs in large part, and abdomen, pale yellow or yellowish white, the abdomen with five rather broad black bands, and also black on middle of basal declivity of tergite 1 . . . . . *perpulchra perpulchra* Cockerell  
 Similar, but light parts of thorax, legs and abdomen bright yellow, the first tergite entirely yellow except for a narrow apical black band . . . . . *perpulchra flavidior* subsp. nov.
6. Frons dull or opaque, obscurely punctate or impunctate . . . . . 7  
 Frons at most dullish, distinctly although minutely punctate . . . . . 12
7. Wings slightly dusky hyaline, the nervures and stigma testaceous or pale brown; hair of hind tibiae more or less fuscous . . . . . 8  
 Wings whitish or milky hyaline, the nervures pale yellow or whitish, the stigma frequently yellow or pale orange; hair of hind tibiae usually but not always light . . . . . 9
8. Wings rather distinctly dusky, the nervures and stigma pale brown; clypeus, except two dark stripes which are abbreviated anteriorly and more or less widened behind, transverse lateral marks, and a broad band on tergites 2 to 5, narrowly interrupted medially on 2 and 3, yellow . . . . . *bequaerti bequaerti* Viereck  
 Wings more faintly dusky, the nervures more yellowish; dark stripes on clypeus often enclosing a median yellow stripe, which expands anteriorly . . . . . *bequaerti indianensis* Cockerell
9. Frons dull but not opaque, its punctures obscure . . . . . 10  
 Frons opaque and virtually impunctate . . . . . 11
10. Clypeus strongly produced, the width of the anterior truncation a little less than length of the oblique sides to base of mandibles, the face below antennae prominent in profile; immaculately dark green, with the abdomen blackish, or spot or streak on middle of clypeus, slender transverse lateral marks, two spots on pronotum, and interrupted band on tergites 2 to 4, yellow . . . . . *verbesinae* Cockerell  
 Clypeus less produced, the anterior truncation broader than length of oblique sides, the face below antennae little prominent in profile; more brassy green than *verbesinae*; median streak on clypeus, slender, transversely curved lateral marks, scape of antennae beneath, cuneate marks on pronotum, tubercles, and a broad, interrupted band on tergites 2 to 4, yellow . . . . . *fractinicta* sp. nov.
11. Large, robust species, about 9 mm. long; face entirely dark, or, typically, with median stripe on clypeus and transverse lateral marks, yellow; tubercles at apex, two spots on pronotum, and broad band, usually reaching lateral margins on tergites 2 to 5, also yellow; hair on hind tibiae whitish to pale brownish . . . . . *lacteipennis lacteipennis* Swenk and Cockerell

- Slightly smaller; abdominal bands rather narrow, not quite reaching lateral margins and narrowly interrupted on tergites 2 and 3; marks on pronotum and tubercles large; face marks large, the clypeus yellow except for two triangular dark areas on disk, with the yellow extending triangularly upward between them; hair of hind tibiae sometimes pale fuscous; length about 7-8 mm. . . . . *lacteipennis pallidipennis* Graenicher
12. Clypeus more prominent, and more produced, the disk fully as long or a little longer than wide. . . . . 13  
 Clypeus less produced and prominent, the disk somewhat broader than high; head therefore appears to be slightly broader than long, with face below antennae much less prominent in profile. . . . . 15
13. Frons minutely tessellate, shining, and minutely punctate; yellow bands of abdomen usually broad, and a yellow mark present on each side of disk of tergite 1. . . . . 14  
 Frons rather strongly tessellate, more dullish and much more strongly punctate than in *albipennis*; a rather narrow yellow band, not reaching lateral margins on tergites 2 to 4; tergites 1 and 5 immaculate, or 5 with two yellow spots which are usually small or faint. . . . . *tricincta* sp. nov.
14. Head and thorax dark olive-green; hair of legs light, the scopa of hind tibiae pale yellowish, yellow abdominal bands usually reaching lateral margins; face marks pale yellow, the upper part of clypeus disk with two dark blotches which usually outline a yellow "T" mark. . . . . *albipennis* Cresson  
 Head and thorax brassy green; hair of legs fuscous to blackish, especially on middle and hind legs; abdominal bands broad and even but failing to reach lateral margins; clypeus usually black, with a medium pale-yellow line. . . . . *scopata* sp. nov.
15. Abdomen always dark, the yellow bands nearly or quite reaching lateral margins on tergites 2 to 5, and tergite 1 dark with a yellow mark on each side of disk; median yellow mark on upper part of clypeus not much narrowed above and often T-shaped. . . . . 16  
 Abdomen sometimes yellow, with dark subapical and basal spots on each side of segments; or sometimes dark, with enclosed yellow band on tergites 2 to 5, broadest at middle and narrowed toward sides (in which case tergite 1 lacks yellow lateral marks on disk, but may be more or less yellow at base); dark blotches on upper part of clypeus large, the yellow intrusion between them pointed above. . . . . 17
16. Frons more or less distinctly tessellate and dullish, the punctures minute; yellow bands on tergites 2 to 5 rather even and entire, narrow on tergite 2 and gradually wider on successive segments, that on tergite 5 subabbreviated,  
*lepachidis lepachidis* Cockerell  
 Frons almost polished, the punctures consequently very distinct; markings as in *lepachidis*, but bands on tergites 2 and 3 generally more or less notched medially behind, and that on 2 sometimes distinctly interrupted. . . . . *lepachidis levifrons* subsp. nov.

17. Abdomen and legs not almost entirely yellow; the abdomen with dark markings, at least on tergites 1 to 4. . . . . 18  
 Abdomen and legs almost entirely yellow; four small fuscous spots on disk of tergite 1, and two small subapical spots on tergite 2; femora of front and middle legs with a pale-brown blotch on inner side. . . . . *coreopsidis kansensis* subsp. nov.
18. Abdomen yellow with a dark band at junction of tergites 1-2 to 4-5, more or less reduced to a basal spot on lateral margins and a subapical spot on each side; tergite 1 also with a dark blotch on each side at summit of basal declivity,  
*coreopsidis coreopsidis* Cockerell  
 Abdomen dark above with an enclosed yellow band on tergites 2 to 5, broadest in middle and narrowed at outer ends; tergite 1 also more or less yellow at base,  
*coreopsidis obscurior* subsp. nov.

*Perdita utahensis* Cockerell

Five males, 2 females, 10 miles south of Tucson, Arizona, Aug. 7, 1940 (C. D. Michener); 5 males, 1 female collected by the writer at the same place and time were found at flowers of *Verbesina encelioides*. Cockerell described only the female of this species from a specimen collected in southwestern Utah.

MALE.—Head and thorax dark blue-green. Spot at anterior end of cheeks, mandibles, except rufous tips, labrum, clypeus, large triangular lateral marks reaching level of antennae, first three joints of antennae broadly beneath, collar and posterior band on pronotum, narrowed mesad, and the tubercles, bright yellow. Sometimes upper margin of subantennal plates yellow, and this even confluent with lateral marks. Legs blackish, the trochanters in part, the femora broadly at apex and an anterior stripe on front and middle pair, the tibiae except behind, and the tarsi, yellow. Flagellum orange ferruginous, becoming dusky above; the pedicel and apex of scape fuscous above. Abdomen shining blackish, the apical tergite testaceous yellow, and the apical depression of tergites 1 to 6 whitish subhyaline. Preceding the depression is a yellowish-white band on tergites 1 to 6, this band obliterated except on lateral margins on tergite 1, dilated on each side and covering reflexed sides on tergites 2 to 6, and with remaining part of band broadly interrupted, or almost so, sublaterally, and notched or subinterrupted medially on tergites 3 to 5, but the same part on tergite 2 generally obliterated. Tegulae yellow at base and almost hyaline on outer margin. Wings whitish, with a slight dusky-yellowish opacity. Nervures and stigma yellowish, the margins of stigma generally slightly brownish.

Head quadrate, the cheeks broad. Face below antennae polished, impunctate. Vertex and frons minutely granular-tessellate, the latter moderately shiny and minutely punctate. Mesonotum nearly polished and set with minute, moderately close punctures. Pubescence white and moderately dense. Length, about 6-7 mm.; anterior wing, 4.3-4.9 mm.

*Perdita baileyae* Cockerell

One male, Rice Co., Kansas, July 3, 1923 (C. H. Martin).

Cockerell described the male of this species from Mesilla, New Mexico. I have seen a female from San Xavier Mission, Arizona (E. P. Van Duzee).

*Perdita perpulchra flavidior* subsp. nov.

Cockerell recorded *perpulchra* from Las Cruces, New Mexico, and described the type as having the abdomen white with black bands, the black on the basal tergite extending triangularly to the base, with the white on each side enclosing a black subapical spot. A female taken 15 miles west of Holbrook, Arizona, at flowers of *Erigeron*, Sept. 3, 1930 (Timberlake) agrees well with Cockerell's description, except that the abdomen is more yellowish. In *flavidior* the light parts, except those of face, are bright yellow, and the basal tergite is black only at apex.

FEMALE.—Head and thorax dark olive-green. Basal half of mandibles, clypeus, and triangular lateral marks reaching level of antennae, pale yellow. Scape of antennae, except spot at apex above, under side of pedicel and of first joint of flagellum, prothorax and legs in large part, and abdomen, bright yellow. Coxae at base, under side of front and middle trochanters and femora, spot at apex of hind femora above, posterior surface of front and middle tibiae, hind tibiae entirely and all tarsi, except basal joint of front pair, dark brown or blackish. A black band at juncture of tergites 1-2 to 4-5, with the broad intervening yellow bands distinctly notched on each side behind by sublateral swellings of the black, especially on tergites 2 and 3. Tergite 5 with a narrow, preapical blackish band. Venter pale brownish yellow at base; segments 2 and 3 each with two fuscous patches, and the apical segments extensively fuscous. Tegulae pale testaceous, with a yellow spot at base. Wings somewhat whitish hyaline, slightly tinged with dusky yellowish. Nerves and stigma testaceous yellow.

Head slightly broader than long, the clypeus little produced and prominent. Frons slightly duller, with somewhat closer and fainter

punctures than in *albipennis*. Mesonotum minutely and very closely punctate and covered with fine very short, erect hair. This rather dense pubescence of mesonotum and that of vertex distinctly ochreous. Wings, in comparison with *albipennis*, small and slightly dusky. Length, 8 mm.; anterior wing, 4.8 mm.

One female (holotype), Great Bend, Barton Co., Kansas, on *Heterotheca subaxillaris*, Sept. 9, 1949 (Michener and Beamer).

*Perdita bequaerti indianensis* Cockerell

In preparing the preceding key to the species of *Cockerellia*, I noticed that a specimen from Gary, Indiana, that had been determined by Cockerell as *P. pallidipennis* Graenicher, had somewhat dusky wings, a character which would relegate it to *P. bequaerti* Viereck. I conclude that *indianensis* that was based on a male from Lafayette, Indiana, must be the same as the Gary specimen, since the margins of stigma and end of marginal cell could not be described as fuscous unless the wings were slightly dusky, rather than milky hyaline as in *pallidipennis*.

This is a rather weakly developed race of *bequaerti*, and was described as a race of *pallidipennis*. It and *P. wickhami* Cockerell were published in the same paper and must be the sexes of practically the same thing (new synonymy).

*Perdita verbesinae* Cockerell

Five males, 9 females, Portal, Arizona, on *Verbesina encelioides*, Aug. 12, 1940 (C. D. Michener).

Specimens of this species, even those of a series taken at the same spot, vary greatly in the extent of the yellow markings, and sometimes lack the markings altogether. Such immaculate specimens were named var. *nigior* by Cockerell in his original description.

*Perdita fracticincta* sp. nov.

This species is allied to *P. lepachidis* Cockerell and *P. coreopsidis* Cockerell in the shape of the head, but in the strongly tessellate and dull frons, the greatly reduced face marks, and the interrupted abdominal bands it strongly resembles *verbesinae*.

FEMALE.—Brassy green, the labrum and clypeus black, the latter green, however, on upper margin of disk. Small longitudinal median spot on clypeus, a small transverse spot on each lateral extension of clypeus, and slender to transversely arcuate lateral marks, yellow. The lateral marks bordering anterior margin of lateral plates of face are slightly interrupted on one side and have



a short extension upward on orbits. Interrupted band on hind margin of pronotum, and the tubercles, yellow. Abdomen blackish, a small spot on lateral margins of tergite 1 (mostly on the reflexed ventral portions) and interrupted band on tergites 2 to 4, yellow; band on tergite 2 reaching the lateral foveae, and that on 3 having a faint, slender posterior extension to lateral margins. Mandibles and pygidium rufo-testaceous, the former more rufous at apex. Antennae blackish above, the scape yellow, the flagellum brown beneath. Legs blackish, a small spot on front knees and the front tibiae on anterior side, yellow. Tegulae pale testaceous. Wings milky hyaline, nervures nearly colorless, the stigma pale yellow.

Head hardly longer than wide, the clypeus little produced and prominent. Frons and vertex minutely granular-tessellate and rather dull, the minute shallow punctures of frons only moderately distinct. Face below antennae polished, with sparse minute punctures. Mesoscutum polished on disk, although minutely tessellate anteriorly, and provided with rather close minute punctures. In some ways, including shape of head, pubescence, size, etc., agreeing closely with *coreopsidis*. Length, 7 mm.; anterior wing, 4.9 mm.

One female (holotype) 29 miles south of Sarita, Willacy Co., Texas, on *Coreopsis*, Apr. 14, 1950 (Michener, Beamer, Stephen and Rozen).

*Perdita lacteipennis lacteipennis* Swenk and Cockerell

Unquestionably a common species in western Kansas at flowers of *Helianthus*, as there is a series of 127 females and 145 males in the University of Kansas collection from various localities in the Counties of Chase, Reno, Sheridan, Ottawa, Hamilton, Greeley, Meade, Ford, Finney, Pawnee, Osborne, Barton, Pratt, Russell, Rawlins, Saline, Ellsworth, Comanche, Stafford, Clark, Decatur, Rice, and Rooks. Nearly all the specimens that are labeled with the flower record were taken on *Helianthus petiolaris*, but 6 males from Chase and Hutchinson were on *Prionopsis ciliata*. The dates of capture range from June 14 to Sept. 6.

Also 79 specimens from La Junta, Colorado, two of them labeled as from *Helianthus annuus*; 2 males, Lamar, Colorado (Snow); 1 male, Artesia, Moffat Co., Colorado, on *Helianthus petiolaris*, July 22, 1950 (Michener); and 1 male each from Leonard, North Dakota, July 25, 1937, and Lusk, Wyoming, July 14, 1937 (C. L. Johnston).

Specimens from western Kansas are mostly typical *lacteipennis*, although about 10 per cent of the females have the face marks very small or absent and thus agree with the form *canadensis* Crawford.

Of 28 females from La Junta, Colorado, 6 verge toward *canadensis* (face marks obsolescent), 6 verge toward *pallidipennis* (clypeus with a yellow spot on each side besides the median mark), and 16 are typical *lacteipennis*.

*Perdita lacteipennis pallidipennis* Graenicher

Thirty-two females, 15 males, Douglas Co., Kansas, on *Helianthus annuus*, Sept. 9, 1949 (Michener and Beamer); 3 females, Topeka, Kansas, Sept. 17, 1910 (E. G. Titus).

These specimens are nearly typical *pallidipennis*, the female of which has the clypeus yellow, with a dark blotch above on each side of disk, or the dark color frequently reduced to a short strip on each side. Males have the basal half of mandibles, labrum, and anterior border of face yellow.

Specimens from Clay Co., Kansas (J. C. Bridwell), average somewhat closer to *pallidipennis* than to typical *lacteipennis* but probably should be classed as intermediates.

In the original description of *lacteipennis* it is stated on the authority of Prof. Myron Swenk that the species does not occur in eastern Nebraska. However, the species does occur there, as I have a female of *pallidipennis* from Nebraska City on *Helianthus*, Sept. 14, 1901 (M. A. Carriker). The form *pallidipennis* has the face markings much as in *albipennis* and hence must have been confused with *albipennis* by Swenk. The dull frons of *lacteipennis* and the shining punctate frons of *albipennis* easily distinguish the two species.

*Perdita tricincta* sp. nov.

Nearest *P. albipennis* Cresson, but distinguished by the duller, more tessellate, and more coarsely punctate frons, and by the three narrow bands on abdomen (the yellow on the fifth tergite restricted to two small spots or absent). The male has a dark, shining abdomen and transverse yellow face marks.

FEMALE.—Head and thorax dark green, the mesonotum somewhat brassy. Labrum and clypeus blackish, the latter with a broad, pale-yellow, median stripe and a suffused yellowish mark on each side. Lateral marks pale yellow, rounded at inner ends and generally somewhat less than twice as broad as high. Mandibles testaceous brown, the tips dark rufous. Collar of pronotum obscurely yellowish, the hind margin and tubercles bright yellow. Abdomen blackish, with a rather narrow yellow band on tergites 2 to 4, that on 2 ending at the lateral fovea, the others not quite

reaching lateral margins, all slightly notched medially, those on tergites 2 and 3 behind and that on tergite 4 in front. Tergites 1 and 5 entirely black, or the latter frequently with two submedian yellow spots. Pygidium ferruginous brown. Legs blackish, the front tibiae yellowish on anterior side. Antennae blackish, the scape narrowly clear yellow and the flagellum brown beneath. Tegulae pale testaceous. Wings milky hyaline, the nervures nearly colorless, the stigma pale yellow.

Head about as broad as long, with the clypeus produced and prominent. Facial foveae about one third as long as eyes. Sculpture as in *albipennis*, except the frons duller, with a stronger tessellation and coarser punctures. Pubescence of vertex and mesonotum more ochreous than in *albipennis*. Scopa of hind tibiae a pale yellowish brown. Length, 7.5-9 mm.; anterior wing, 5-5.2 mm.

MALE.—Head and thorax dark green. Base of mandibles, anterior band on clypeus (more testaceous far laterad), sometimes a median streak on clypeus to summit, and lateral face marks, about twice as wide as high, yellow. Mandibles testaceous in middle and rufous at tips. Labrum testaceous. Antennae orange-brown, a little dusky on apical half of flagellum above, becoming darker toward base of flagellum, and blackish on pedicel and on the scape except at base, with underside of scape and of first joint of flagellum yellow. Collar of pronotum yellowish, especially toward the middle, a small cuneate spot on posterior corners of pronotum clear yellow, but tubercles dark. Abdomen shining blackish, the apical tergite testaceous, the apical depression of preceding segments subhyaline. In some specimens, including the allotype, there is a trace of yellow just in front of the apical depression on tergites 5 and 6 and on the reflexed sides of the preceding segments. Legs blackish; all tarsi, front tibiae broadly and middle tibiae narrowly on anterior side, and front and middle knees, yellow. Tegulae and wings as in female. Head quadrate, the cheeks broad. Sculpture as in female, the pubescence white. Length, 5.3-8 mm.; anterior wing, 4-5 mm.

Holotype female and allotype, Southmost, Cameron Co., Texas, on *Helianthus annuus*, Apr. 13, 1950 (Beamer, Michener, Stephen, and Rozen). Paratypes as follows: 30 females, 40 males taken with the types; 1 male, 5 miles east of Brownsville, Apr. 13, 1950; 3 females, 4 males, Progresso, Hidalgo Co., on *Helianthus annuus*, Apr. 12, 1950; 1 male, 6 miles east of Rio Grande, Starr Co., Texas, Apr. 12, 1950 (all, Michener, Beamer, Stephen, and Rozen).

*Perdita albipennis* Cresson

The material recorded below belongs almost entirely, in respect to the females, to the variety *lingualis* Cockerell, which is the best-known and the most common form of *albipennis* in collections. This more highly colored form is, according to Cockerell, possibly a valid race. The male variety *helianthi* Cockerell, with yellow markings on abdomen and a more or less blackish flagellum, flies in about equal numbers with males having the flagellum orange brown or ferruginous and the abdominal markings obsolete, and both fly with *lingualis*. The *P. hyalina* Cresson, without face or abdominal markings indicated in the original description, seems distinct from *albipennis*. The variety *pasonis* Cockerell, with a dull frons, is more likely allied to *P. lacteipennis* than to *albipennis*. Altogether, therefore, it is necessary to have a much fuller collection of *albipennis* in order to understand its variation and possible subspeciation.

The following material of *albipennis* has been examined:

Kansas: 14 females, 17 males, Clark Co., 1,950 feet, Aug. 23, 1911; 2 females, 1 male, Rawlins Co., 2,850 feet; 1 female, Norton Co., 2,270 feet, Aug. 12, 1912; 2 females, Smith Co., 1,800 feet, Sept. 4, 1912; 2 females, 1 male, Stevens Co., 2,700 feet, Aug. 10, 1911; 1 male, Sherman Co., 3,690 feet; 1 male, Ellis Co., 2,000 feet, July 18, 1912; 1 male, Decatur Co., 2,560 feet (all F. X. Williams); 1 male, Ness Co.; 10 females, 4 males, Sharon Springs, Wallace Co., on *Helianthus annuus*, Aug. 23, 1931 (Timberlake); 1 male, Lakin, Kearny Co., on *Helianthus petiolaris*, July 23, 1950 (C. D. Michener).

Colorado: 4 males, La Junta, July 3, 1949 (R. H. Beamer and J. R. White).

Wyoming: 1 male, Lingle, Goshen Co., July 14, 1937 (C. L. Johnston).

New Mexico: 1 female (probably belonging here, but it cannot be identified positively as the head is missing), Cuervo, Guadalupe Co., June 23, 1940 (E. E. Kenaga).

Arizona: 1 male, Fort Apache, Navajo Co., Aug. 26, 1897 (Snow, No. 2113).

*Perdita scopata* sp. nov.

This species is much like *P. albipennis*, but the hair of middle and hind legs and that of front tarsi more or less blackish, a character more faintly indicated in some of the other species of *Cockerellia*, such as *P. bequaerti* and *P. lacteipennis pallidipennis*, which, how-

ever, have the frons dull and impunctate. The male of *scopata* has the face markings greatly reduced or absent and the abdomen immaculate, opaque black.

FEMALE.—Head and thorax dark green, the frons, vertex, and mesonotum with a strong brassy luster, the labrum and clypeus black. Line on under side of scapes, median line on clypeus, not reaching anterior margin, and slightly transverse lateral marks, whitish. The lateral marks, rounded at inner ends, extend about half way to level of antennae. Sometimes a transverse whitish spot on lateral margins of disk of clypeus. Mandibles black at base and rufous on apical third or half. Antennae blackish, the flagellum slightly rufescent beneath. Tubercles and hind margin of pronotum pale yellow, the anterior margin narrowly yellowish. Abdomen black, the pygidial plate dark rufous. Tergites 2 to 5 each with a broad yellow band, these bands more even than in *albipennis* and falling distinctly short of the lateral margins. A slender, oblique, more or less sinuate and broken yellow line on each side of the base of the disk of tergite 1. Legs blackish, the front knees and a line on anterior side of front tibiae suffused with yellow. Tegulae testaceous. Wings whitish hyaline, the nervures and stigma pale testaceous yellow (in comparison with *albipennis* the wings have a barely perceptible dusky tinge and the nervures are less pallid). Structure, sculpture, and pubescence as in *albipennis*, with the following differences: cheeks less broadened and clypeus less prominent; punctures of mesonotum slightly closer; abdomen dull, with an excessively minute tessellation; pygidium very broad and broadly subtruncate at apex; basal middle of propodeum minutely rugose; pubescence flavo-ochraceous on top of head and on mesonotum, more or less dark fuscous on middle and hind legs and front basitarsi, and dilute fuscous at apex of abdomen. Length, 7-9 mm.; anterior wing, 5-5.5 mm.

MALE.—Dark green, the mesonotum with a brassy luster, the base of mandibles, labrum and clypeus shining black. Abdomen opaque black, the apical depression of tergites more shining but not pallescent; tergite 7 becoming brownish testaceous on apical half. No light facial thoracic or abdominal markings, except rarely a small pale-yellow spot on each side of disk of clypeus and another opposite anterior corners of eyes. Mandibles rufous at apex. Antennae blackish, the scape pale testaceous at extreme base, the flagellum brown beneath. Legs blackish, a small spot on front and middle knees pale yellowish, the front and middle tarsi testaceous yellow, and the hind tarsi brownish. Tegulae testaceous. Wings milky

hyaline, with pale-yellow nervures and stigma (wings distinctly whiter than in female). Structure, sculpture, and pubescence similar to condition in male of *albipennis*, except the frons slightly duller, with less distinct punctures, mesonotum with somewhat closer punctures, base of propodeum with a small, triangular, finely rugose area, and abdomen dull from an excessively minute thimble-like tessellation. Length, 6-8 mm., anterior wing, 5-5.5 mm.

Holotype female and allotype, 29 miles south of Sarita, Willacy Co., Texas, on *Coreopsis*, Apr. 14, 1950 (Beamer, Michener, Stephen, and Rozen). Paratypes as follows: 25 females, 61 males, taken with the types; 10 females, 36 males, same locality and date, at flowers of *Helianthus annuus*; 7 females, 4 males, Southmost, Cameron Co., on *Helianthus annuus*, Apr. 13, 1950; 1 male, 5 miles east of Brownsville, Apr. 13, 1950 (Beamer, Michener, Stephen, and Rozen); 1 female, 20 miles south of Sarita, on yellow composite, April 2, 1946 (C. D. Michener); 1 female, Hidalgo Co., Texas, May 5, 1929 (H. B. Parks); 1 female, 1 male, Brownsville, June (F. H. Snow, No. 2428); and 1 female, 1 male, Galveston, May (Snow, No. 1824).

The Brownsville specimens taken in June (Snow) differ in having considerably larger face marks than usual.

#### *Perdita lepachidis lepachidis* Cockerell

This species was described in 1896 from Santa Fe and Socorro, New Mexico. Only the male was known to Cockerell, who collected it at flowers of *Ratibida tagetes* (the plant was then called *Lepachys tagetes*).

FEMALE.—Brassy green, much as in *coreopsidis*, but the median pale-yellow area of clypeus briefly crossed at the top like a "T" and expanding below, or sometimes isolated and Indian club-shaped (in *coreopsidis* triangular and pointed above). Anterior and posterior margin of pronotum and tubercles bright yellow. Abdomen blackish, with a spot on each side of tergite 1 and a crossband on tergites 2 to 5, bright yellow; these bands reaching lateral margins or nearly so, and that on tergite 2 rather narrow, but those on tergites 4 and 5 broad and emarginate behind on each side. Legs dark, the anterior side of front and middle tibiae and a small spot on knees, yellow. Scape of antennae yellow except at apex above, the flagellum brown above and yellowish brown beneath but becoming yellow beneath on the basal joint and on the pedicel. Tegulae pale testaceous. Wings milky hyaline, the nervures and stigma pale yellow. Length, about 7 mm.; anterior wing, 5-5.3 mm.

Four females, Lakin, Kearny Co., Kansas, on *Ratibida columnaris*, July 23, 1950 (C. D. Michener); and 1 female, Sheridan Co., Kansas, 2,650 feet (F. X. Williams).

The specimen from Sheridan Co. differs in having the clypeus yellow with two dark stripes which are irregular, that on the left side forming a figure 7 and that on the other side confluent with the usual lateral dot.

I have examined, also, a pair from Alpine, Texas, July 8, 1942 (H. A. Scullen), one female from Sterling, Logan Co., Colorado, May, 1923 (Grace Sandhouse), and two males from Santa Fe and Socorro, New Mexico (Cockerell).

*Perdita lepachidis levifrons* subsp. nov.

This race differs from typical *lepachidis* in the smoother, more shining frons and in the more restricted facial and abdominal markings.

FEMALE.—Brassy green. Lateral face marks and clypeus pale yellow, the disk of latter with a blackish blotch (becoming green on outer margin above) on each side, isolating a rather slender median yellow streak, which is briefly crossed at summit to form a "T." Yellow abdominal bands not quite reaching lateral margins, that on tergite 5 generally much abbreviated, those on tergites 2 and 3 notched medially behind, and that on tergite 2 frequently narrowly interrupted in middle. Flagellum more ferruginous and the dark part of legs, especially on tibiae, more brownish than in *lepachidis*. Frons so delicately tessellate as to be almost polished, its punctures minute but distinct. Length, 6.5-7.5 mm.; anterior wing, 4.8-5.1 mm.

MALE.—Not appreciably differing from male of *lepachidis* from New Mexico, except that frons is nearly polished and the wings are smaller. Length, 6-7 mm.; anterior wing, 4.3-4.6 mm. (length of wing in New Mexico male, 5 mm.).

Nine females, 4 males (holotype female, allotype, and paratype), Brownsville, Texas, June (F. H. Snow, Nos. 2416 and 2417). Three of the females lack the abdomen.

*Perdita coreopsidis coreopsidis* Cockerell

This species was described from specimens collected at Cotulla, La Salle Co., Texas, at flowers of *Coreopsis*, but it apparently prefers *Gaillardia* to any other flower.

Texas: 2 females, 1 male, Catarina, Dimmit Co., on *Monarda punctata coryi*, Apr. 11, 1950 (Beamer, Michener, Stephen, and Rozen).

Kansas: 9 males, Dodge City, Ford Co., on *Gaillardia*, June 15, 1949 (Michener and Beamer); 1 female, Satanta, Haskell Co., on *Gaillardia*, June 16, 1949 (Michener and Beamer); 1 female, 5 miles north of Quinter, Sheridan Co., on *Gaillardia*, June 17, 1950 (Michener); 1 male, Ashland, Clark Co., on *Gaillardia*, June 12, 1949 (Michener and Beamer); 4 females, 4 males, Larned, Pawnee Co., on *Gaillardia*, June 14, 1949 (Michener and Beamer); 2 females, Clark Co., 1,962 feet, May and June (F. H. Snow, Nos. 1160 and 1161); 2 females, Gove Co., 2,813 feet (F. X. Williams).

*Perdita coreopsidis kansensis* subsp. nov.

This form flies with the typical subspecies on the northwestern border of the known range of *coreopsidis*, but farther south and west it apparently attains the status of a race. It differs from typical *coreopsidis* in having the legs and abdomen of the female nearly all yellow, and the abdomen of male yellow with dark bands.

FEMALE.—Like typical *coreopsidis* except in color of legs and abdomen. Legs yellow, the anterior and posterior surface of front femora beneath except at apex, and anterior side of middle femora beneath except apex, brown or fuscous, and the hind margin of middle and hind tibiae and basitarsi slightly darkened. Abdomen yellow, with four fuscous spots on tergite 1 and sometimes two spots on tergite 2, these spots being situated as in the spotted form of *coreopsidis*, but small.

MALE.—Yellow face markings similar to those of female (obsolete or nearly so in typical male). Apex of femora, the tibiae and tarsi nearly all yellow (the yellow mainly restricted to anterior side of front tibiae in typical male). Tergite 1, except a narrow apical light crossband, and a crossband at base of tergites 2 to 5, black, the rest of abdomen yellow, except for a small transverse preapical dark spot on each side of tergites 2 and 3. Apical depression of tergites whitish subhyaline as in the typical male.

Two females, 1 male (holotype female, allotype, and paratype), Gove Co., Kansas, at 813 feet (F. X. Williams); 1 male (paratype), Dodge City, Ford Co., Kansas, on *Gaillardia*, June 15, 1949 (Michener and Beamer); and 1 male (paratype), Van Horn, Culberson Co., Texas, May 23, 1932 (E. G. Linsley).

*Perdita coreopsidis obscurior* subsp. nov.

This race of *coreopsidis* appears to be restricted to the coast of Texas, from the mouth of the Rio Grande to Galveston. It differs



from the typical form in the less extent of yellow markings, and in the slightly sparser puncturation of the mesoscutum.

FEMALE.—Like *coreopsidis* except in color of abdomen. Tergite 1 nearly all dark except at base, and the following tergites fuscous or blackish around the margins to enclose a broad yellow band that is more or less narrowed and acute at outer ends. On tergites 4 and 5 the dark margin sometimes broadly interrupted in middle apically and more rarely also at the sides, thus more or less isolating two dark spots before the apical depression. Length, 6-7.5 mm.; anterior wing, 4.1-4.6 mm.

MALE.—Mandibles except tips and lateral extensions of clypeus, yellow; disk of clypeus black, with the yellow sometimes intruding slightly on each side anteriorly. Abdomen with the yellow markings evanescent or absent and never forming more than a thin line interpolated between the dark base and the subhyaline apical depression. Punctures of mesoscutum moderately close. Length, 4.8-6.5 mm.; anterior wing, 3.9-4.4 mm.

Sixteen females, 59 males (holotype female, allotype, and paratypes), Boca Chica, Cameron Co., Texas, on *Gaillardia*, Apr. 13, 1950 (Beamer, Michener, Stephen, and Rozen). Also the following paratypes: 1 female, Brownsville, July 3, 1938 (R. H. Beamer); 2 females, 12 males, Brownsville, Apr. 13, 1950 (Beamer); 6 females, 2 males, 18 miles north of Harlingen, Cameron Co., on *Gaillardia*, Apr. 2, 1938 (C. D. Michener); 1 female, 1 male, Galveston, May (F. H. Snow, Nos. 1825, 1826); and 3 females, 1 male, Corpus Christi, June 28, 1942 (E. S. Ross).

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